Aneura maxima – a liverwort new to Poland

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Abstract – Aneura maxima has been recently discovered for the first time in Poland at three localities in the lowlands and one in the mountains. Poland is the seventh European country where occurrence of A. maxima has been recorded so far. Morphological description, habitat preferences and distribution map of plants collected in Poland are given.

Liverworts / Aneura maxima / oil bodies / morphology / Europe / Poland

INTRODUCTION

Described in 1898 from Java, Aneura maxima (Schiffn.) Steph. was known until the 1990s only from Asia: Japan (central Honshu), Indonesia, New Caledonia and India; but also from the Appalachians and Piedmont in North America (Furuki, 1991; Schuster, 1992). In 1994, this species was found in Europe for the first time: in Belgium, in the Ardennes Massif (Andriessen et al., 1995). Now A. maxima is known also from several other localities in Europe: France (Sotiaux & Sotiaux, 1996), Finland (Frahm, 1997), Denmark (Thingsgaard, 2002), and Luxemburg (Werner, 2003) and Czech Republic (Kučera, 2004). In Poland, A. maxima was not recorded previously (Koła & Turzańska, 1995). During our intensive studies of the A. pinguis complex in Poland conducted in 2002-2005, in four sites (reserve Diabli Skok near Walcz, in the Białowieża National Park, in the reserve Redykajny near Olsztyn and in the Tatra Mts.) we found very large plants of Aneura Dumort., which morphologically fitted very well the descriptions of A. maxima reported from Belgium (Andriessen et al., 1995).

MORPHOLOGICAL AND ANATOMICAL DESCRIPTION OF COLLECTED PLANTS

Plants dioecious, when fresh green, lustreless; thalli very large (10-12 mm wide and 45-80 mm long), with relatively distinct costa and wings. Margins of

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thalli unistratose and translucent, undulate with occasional incisions forming lobes (Fig. 1). Thallus c. s. in costal region 450-490 μm (10-13 cells) thick. Wings very wide, 15-22 cells wide, unistratose part of 3-4 cell rows. Inner cells of thallus thin-walled, without chloroplasts, large: (42.8-54.7-71.4 μm x (47.6)-83.3-95.2 (-123.8) μm. Epidermal cells chlorophyllose, smaller: 26.2-38.1 μm x 45.2-71.4 μm. Numerous, thin-walled, colourless rhizoids (19.0-28.6 μm diameter) restricted only to costal region. Slime papillae occurring on ventral side near thallus, apical cell of slime papillae hyaline, large: 23.8-35.7 μm x 95.2-169.0 μm. Oil bodies present in all epidermal cells, spherical to ovoid, small 2-3(-4) μm, homogeneous and glistening, or rarely finely granulate, 20-35 per cell (Fig. 2). Fertile plants present in all Polish collections, male plants more frequent. Androecial branches short; archegonia situated in a deep sinus, usually on both side of thallus and surrounded by cilia 600-1100 μm long. Calyptrae smooth, (only one plant with two immature calyptrae found); sporophytes not seen.

**Collection sites of examined specimens, all specimens are deposited at POZW herbarium.**

**ASSOCIATED SPECIES AND HABITAT PREFERENCES**

In all localities in Poland, *A. maxima* was associated with *Trichocolea tomentella* (Ehrh.) Dumort. and *Conocephalum conicum* (L.) Dumort. Moreover, in the Diabli Skok reserve it occurred together with *Pellia borealis* Lorbeer, and in the Białowieża National Park with *Pellia epiphylla* (L.) Corda. In all localities, *A. maxima* was also accompanied by cryptic species of the *A. pinguis* complex. In the Białowieża National Park it grew together with all cryptic species of *A. pinguis* (A, B and C), in the Diabli Skok and Redykajny reserves with species B and C sensu Szweykowski & Odrzykoski (1990) and Andrzejewska (2000). All species always grew in separate colonies and on different substrata. *A. pinguis* species B occurred on wet rotten wood, species C on the soil on river banks, while *A. maxima* was found on wet humus or peaty soil. In the Diabli Skok reserve it grew on very wet humus in a mire on river banks, in the Białowieża National Park on wet peaty soil in alder swamp (*Carici elongatae-Abnetum*) and on wet humus on banks of drains in *Sphagnum girgenshoni-Piceetum*.

**DISCUSSION**

Plants collected in Poland are morphologically similar to *A. maxima* described by Schiffner (Schuster, 1992). They have very large thallus without the greasy luster that is characteristic for *A. pinguis* (L.) Dumort., and at first glance are similar to *Pellia* Raddi, as has been pointed out by several authors (Furuki,
Fig. 1. *Aneura maxima* (Schiffn.) Steph.: dorsal view of female thallus (a), and male thallus (b), cross section of thallus (c), cross section of median part of thallus (d), cross section of wing (e).
1991; Schuster, 1992; Andriessen et al., 1995). Since 1994, A. maxima has been recorded in Europe in six countries, so Poland is the seventh country where this rare species has been recently discovered. Thus Andriessen’s et al. (1995) hypothesis that A. maxima can be discovered in other places in Europe has been confirmed. Andriessen et al. (1995) suggested that A. maxima in Europe had been so far overlooked and mistaken for Pellia epiphylla or P. neesiana (Gottsch) Limpr.

However, in Poland A. maxima seems to be rather rare, since in spite of intensive studies of the genus Aneura in our country we found it so far only at three localities in the lowlands and one in the mountains. Our plants grew in loose and usually abundant patches, occurred in similar habitats and were associated with the same liverwort species as A. maxima reported from Belgium (Andriessen et al., 1995) and Denmark (Thingsgaard, 2002). Our observations confirm reports of Inoue and Miller (1985), who claimed that there are ecological differences between A. maxima and A. pinguis. However, A. maxima in North America occurred on mineral substrata, like spring banks and wet rocks (Schuster, 1992), while in Japan in various habitats: on humus in swamps, on wet soil, and even on granite rock (Furuki, 1991).

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Fig. 3. Localities of *Aneura maxima* (Schiffn.) Steph. in Poland.

**REFERENCES**


